



الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري  
Arab Academy for Science, Technology & Maritime Transport



The International Maritime Transport and Logistics Conference "Marlog 9"  
Impacts of the Fourth Industrial Revolution on Port-City Integration  
"World Port Sustainability Program Aspects"



**RE-Engineering Arab World (RAW) –  
A study for Promoting Maritime Engineering in Schools**

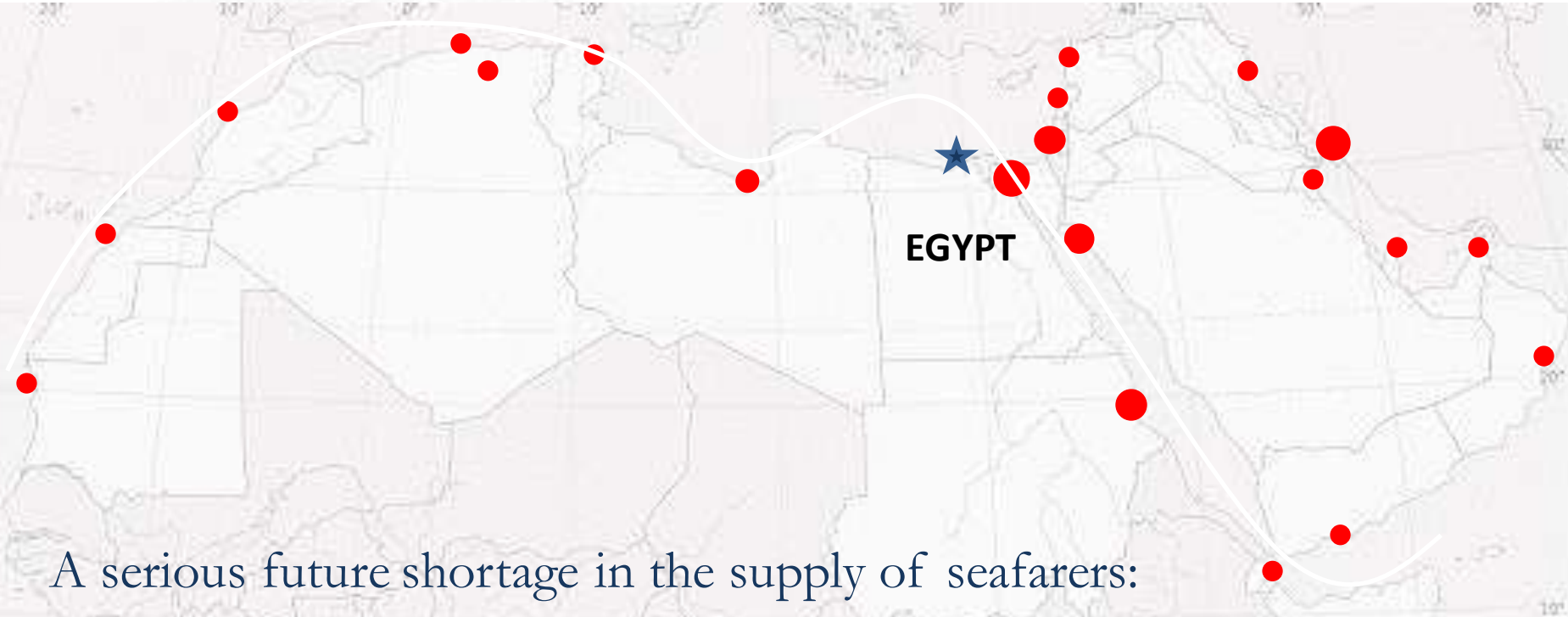
**Dr Ahmed A. Swidan**

FIEAust | FIMarEST | MRINA | CMarEng | Ceng | Marine Chief Engineer

10-12- October, 2020



# Over 80% of world trade is carried by the international shipping industry



A serious future shortage in the supply of seafarers:

- A current shortfall of about 16,500 officers (2.1%)
- A need for an additional **147,500** officers by **2025**.

[BIMCO/ICS, Manpower Report forecasts, 2015]

# Our Vision

To create the entrepreneurs of the future who will re-engineer our Nation's ability to design and create our economic future.

This aspirational outlook means that we must:

- be innovative
- provide leadership in the Arab World
- lead the region in key areas
- make an impact in what we do



# SCHOOLS

## Coastal Seafaring VET and Short Courses

- Fishing Vessels
- River Cruise
- Recreational
- Tug Boats
- Yachts



## Ocean Seafaring COC

## Ship Design

- Fishing boats
- Yachts
- UUVs
- River cruise
- Patrol boats



## Shipyard Technology

- Ship/ offshore Construction
- Green Ship Recycling



# RAW RE-ENGINEERING ARAB WORLD

STEM Educational

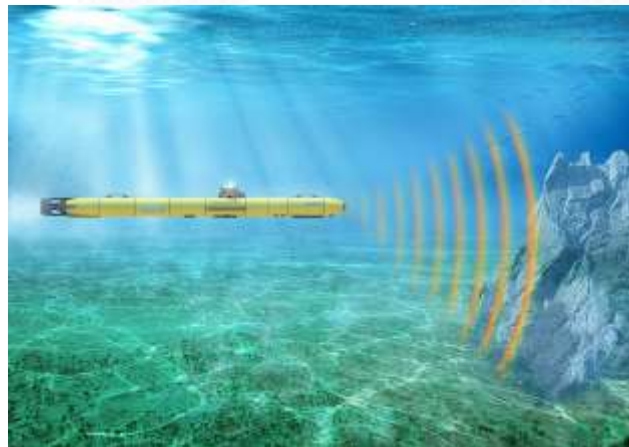
Proudly Supported by the:  
Arab Academy for Science, Technology and Maritime Transport

Engaging, Inspiring and Educating, Students, Teachers and Industry in the Arab World.

By:

Dr Ahmed A. Swidan

FIEAust (AUS) – FIMarEST (UK) – CMarEng (UK) – RINA Committee Member (AUS) – C.Eng (UK)



# Raw programs



## UUVS in Schools Technology Challenge

## UUVS In Schools

Un-manned Underwater Vehicles (UUVS) challenge is designed to equip students with the employability skills and knowledge to allow them to take part in the new set of maritime industries created. UUVS in School is aimed at elementary and secondary students.



## USVS in Schools Technology Challenge

## USVS In Schools

Un-manned Surface Vehicles (USVS) challenge is a multi-faceted and multi-disciplinary program based on the design of renewable energy powered vessels which are unmanned. The USVS use solar power/ and or wind and/or wave energy so are persistent and can stay at sea indefinitely only limited by biofouling. Program focus is toward elementary and secondary students level of education.



## MISSION

To engage, inspire and educate students, teachers and the community about the value of careers based in Science Technology, Engineering and Mathematics.



## VISION

To create the entrepreneurs of the future who will re-engineer our Nation's ability to design and create our economic future.



## VALUE

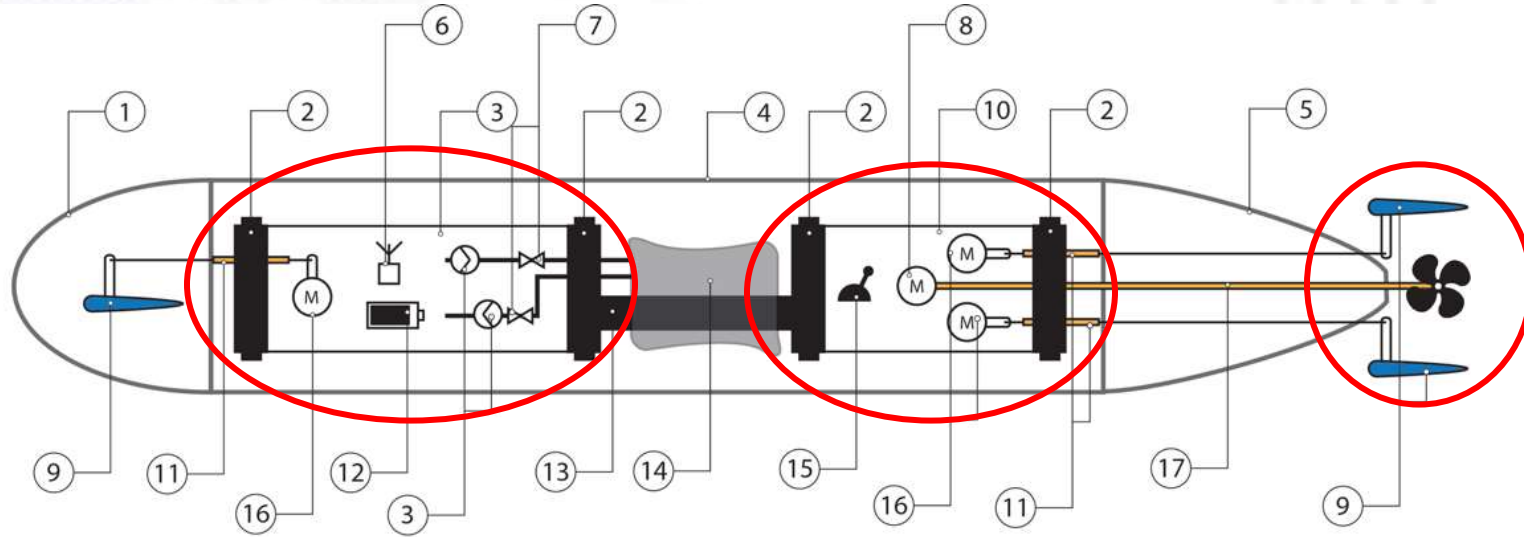
To provide knowledge, guidance and support to students and teachers which will set them on a path to succeed beyond their own expectations.





# Parent Hull

1. Outer Hull - Forward Section
2. Pressure Hull End Cap
3. Pressure Hull - Forward Section
4. Outer Shell - Mid Section
5. Outer Hull - Aft Section
6. Radio Receiver
7. Depth-control Valve
8. Propulsion Motor
9. Control Surface/Linkage Assembly
10. Pressure Hull - Aft Section
11. Linkage Bulkhead Penetration
12. Battery
13. Cable Conduit
14. Depth-control Bladder
15. Electronic Speed Controller
16. Servo Motor
17. Stern Tube

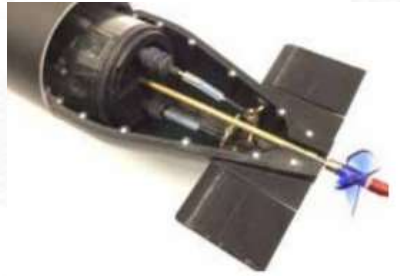


Schematic diagram of Subs in Schools parent kit-model

# Key Areas of Improvement

1

Seaworthiness



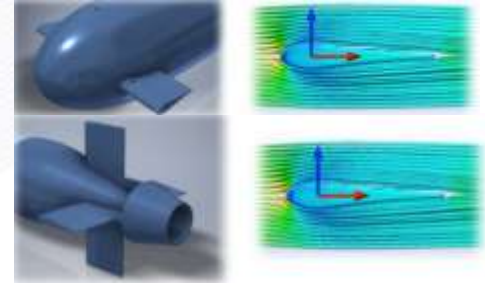
2

Control & Navigation



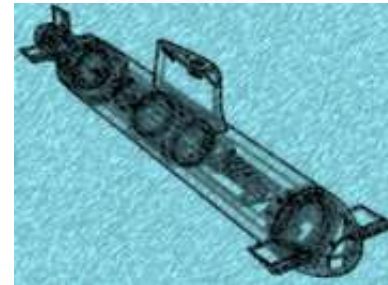
3

Hydrodynamics



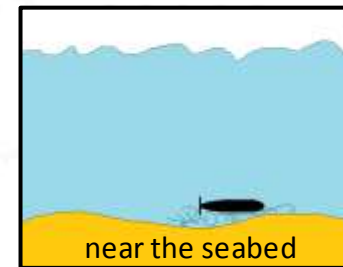
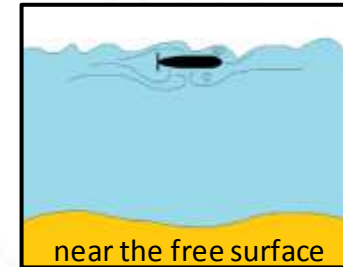
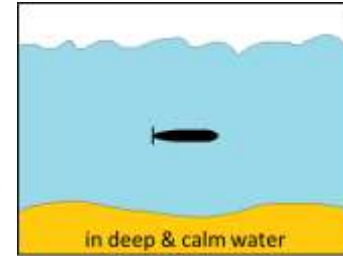
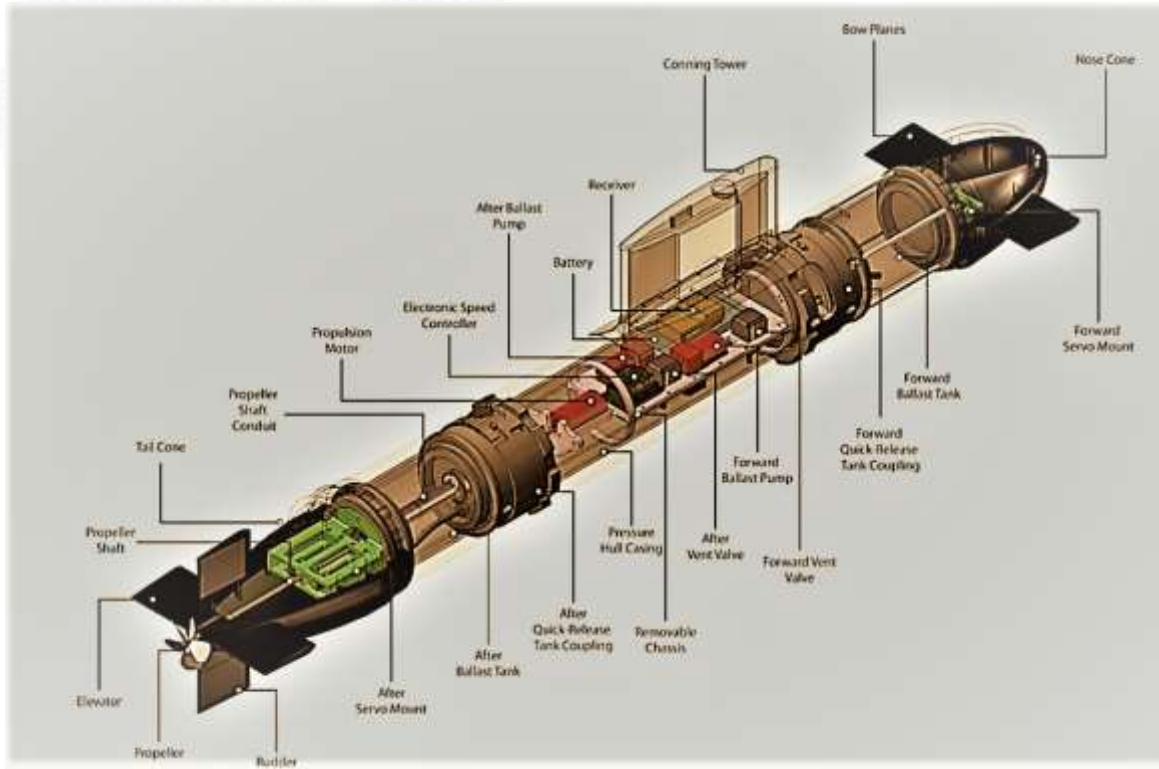
4

The upcoming challenges





# 1 Seaworthiness



# 2 Control and Navigation



- Adaptability of Submarine and Controller
- Speed Control
- Feedback Data about Submarine's State
- Method of Navigation

Introduction of Arduino microcontrollers

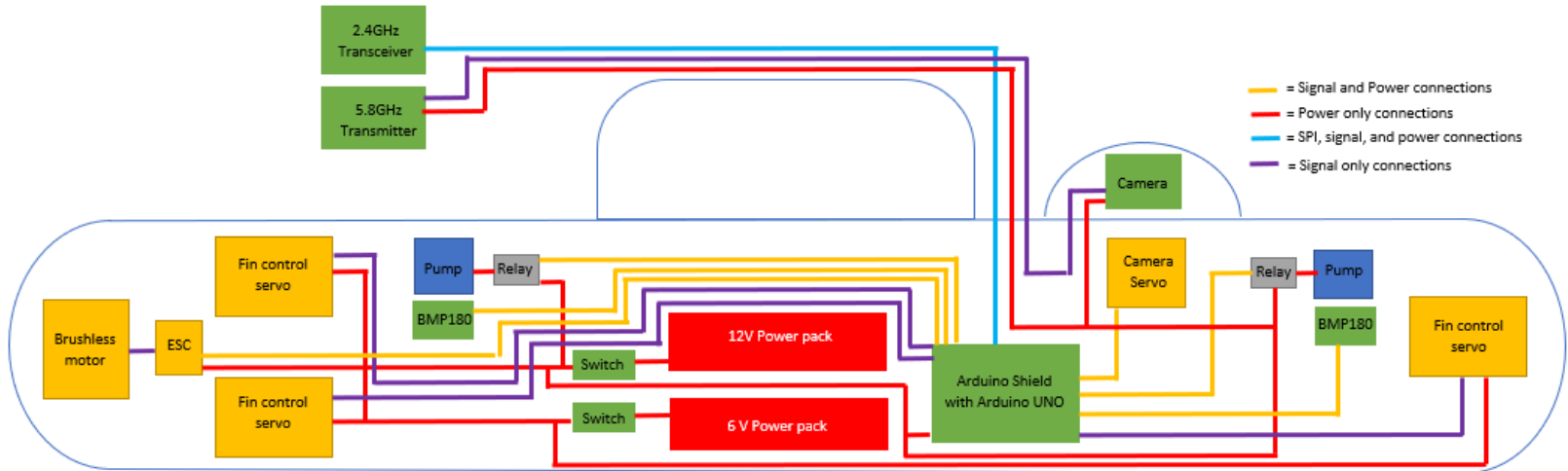
11 different speed settings made including neutral

**The developed controller can display:**

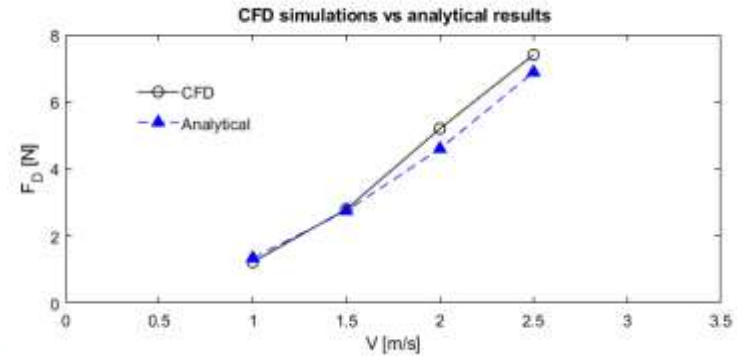
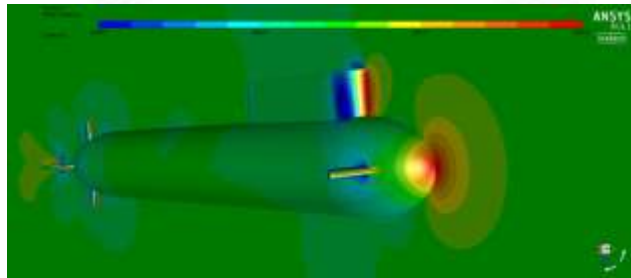
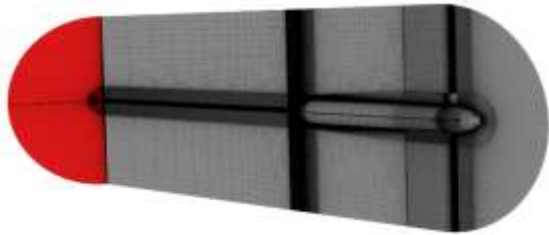
Ballast level, depth and pitch  
Speed  
Drag force  
Fin position

Camera mounted  
Video feed

# 2 Control and Navigation



# 3 Hydrodynamics

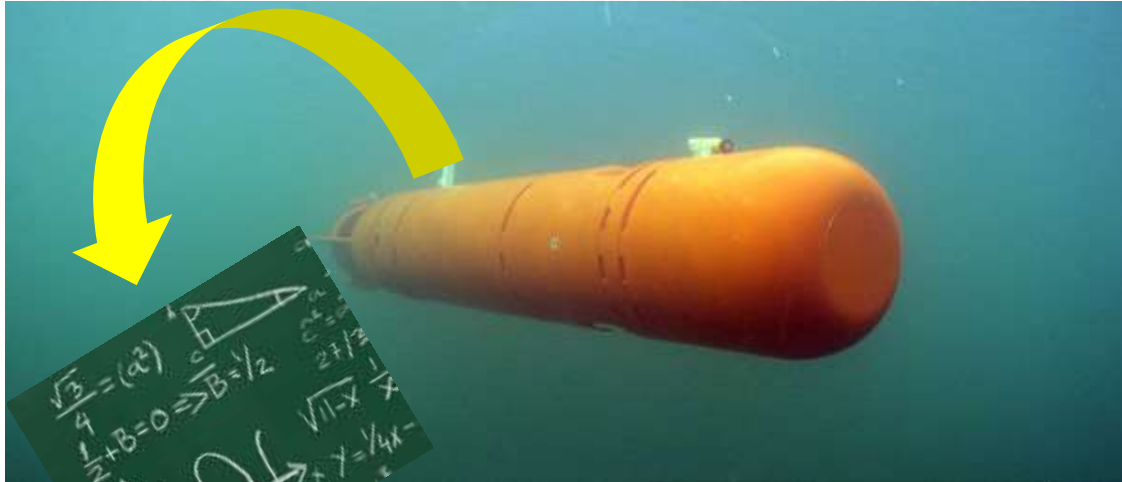


# 4

## The Upcoming Challenges

### System identification (Real Time)

- Real time prediction of hydrodynamic characteristics



# 4

## The Upcoming Challenges

### System identification (Real Time)

Developing an algorithm to estimate external forces acting on the AUV and to improve the navigation safety of the vehicle

Upgrade the existing control strategy of the AUV to adopt the vehicle to its operating environmental condition

Algorithms will be first tested with Matlab Simulink using the real AUV's data obtain from field tests



The MOOS

# In Conclusion, the detailed vision of RAW, is to:

- develop revolutionary hands-on applied learning programs forming a pathway of encouragement and equipping for students in schools;
- include employability (non-curriculum) skills in these programs such as teamwork, collaboration, problem solving, self promotion, public speaking;
- link Universities, industry, schools and parents in a collaborative environment focused on changing the metaphor of the education process;
- encourage Arab student interest and understanding of career options within the Maritime Industry;





# Thank you

Wishing you a successful Conference

**Dr Ahmed A. Swidan**

Senior Lecturer in Maritime Engineering

FIEAust | FIMarEST | MRINA | CMarEng | Ceng | Marine Chief Engineer

